

# Work Order ID 62745

Thursday, October 07, 2010 1:27:33 PM



Page 1

Item ID: D206-667-203

Accept



Setup Start



Revision ID:

Item Name: Crosstube Aft

Stop



Start Date: 10/7/2010 Start Qty: 1.00



Cust Item ID: 7

Required Date: 10/27/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

Date: 10-10-07

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D206-667-243

Rev C

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D206-667-203 CHG003

5/10/12/4

10-11-23

110

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D206-667-243 using CNC bender program 206L-AF

EL 10-11-8

(X1)

120

QC15- Crosstube Dimensional Check

0.00



QC

Memo

0.00

Quality Control

5/10/12/4

(X1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

130

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Drill pilot holes in tube using drill Jig DT8583 & DT8584 as per Dwg D206-667-243 and drill table DT8577. Locate hole #6 for towers as per QSI 10. Drill all (3) top holes.

2-Drill and Ream all holes in tube to finish size using drill Jig DT8583 & DT8584 as per Dwg D206-667-243 Check dimensions between holes on all four sides.

3-Flip tube and switch drilling Jigs from right to left, left to right. Locate Jigs off existing holes using "T" pins.

4-Drill pilot holes using drill Jig DT8583 & DT8584 as per Dwg D206-667-243. Drill only the top (2) holes.

5-Drill & ream the top (2) holes to finish size using drill Jig DT8583 & DT8584 as per Dwg D206-667-243

6-Drill Fwd rivet holes using drill Jig DT8789FWD as per Dwg D206-667-143. Note: Fwd side has 3x top holes.

7-Drill Aft rivet holes using drill Jig DT8789 as per Dwg D206-667-243.

8-C'sink holes as per Dwg D206-667-243.

9 -Scribe part # and batch # using vibrating stylus as per Dwg D206-667-243 Inside of Cuff(Donot engrave on outside of tube)

10 -Deburr & Inspect for surface damage. Repair damage within limits as per

EL 10-11-10

SAD

10-11-10

①

W/O:		WORK ORDER CHANGES					
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Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Dwg  
D206-667-243

140

Crosstubes Chemical Conversion

0.00

3 AM  
10-11-10

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

150

QC3- Inspect Part Finish

0.00



QC

Memo

0.00

Quality Control

160

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

W/O:		WORK ORDER CHANGES					
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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
170  Outsource2	Outsource process - NDT per QSI038 4.1	0.00							
	<b>Memo</b>	0.00							
	Liquid Penetrant Inspection as per QSI 038Or Issue P/O: <u>12912</u> LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order								
180  Packaging	Packaging	0.00							
	<b>Memo</b>	0.00							
	Ensure copy of NDT results attached to work order.								
190  QC	QC5- Inspect part completeness to step on W/O	0.00							
	<b>Memo</b>	0.00							
	Quality Control Ensure results are as per Dwg D206-667-243								

CZ 10/11/12 (1)P 10/11/12 (1)mt 10 11 15 (1)

W/O:		WORK ORDER CHANGES					
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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
200	SprayPaint	0.00							
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside and outside crosstube as per QSI 005 4.2 2-Paint outside crosstube with White Imron as per QSI 005 4.2  PRIME: Start Time: <u>8:00</u> Finish Time: <u>9:00</u>  PAINT: Start Time: <u>1:30</u> Finish Time: <u>2:30</u>								
210	QC14- Inspect Spray Paint	0.00							
QC	Memo	0.00							
Quality Control	Wrap in plastic bag to protect from scratches								

ml 0 11 16 ①

AT 10-11-17

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

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**Accept**

**Setup Start**

**Stop**

**Cust Item ID:**

**THE UNIVERSITY OF CHICAGO**

**Customer:**

**Reference:**

Run Start

**Approvals:**      **Process Plan:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Tooling:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Stop**

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

## Operation Description

## Set Up/ Run Hours

## Tool ID

**Tool #**

**Plan  
Code**

**Accept  
Qty**

## Reject Qty

## Reject Number

## Insp. Stamp

220

0.00



## Crosstubes

## Crosstubes

## Memo

0.00

## Crosstubes

1-Install nut plates as per Dwg D206-667-243.

m/ 10 11 22 (1)

230

0.00



## Skidtubes

## Crosstubes

## Memo

0.00

## Crosstubes

1-Install support using 0.03" to 0.06" thick layer of magnobond 6398 per QSI 015. Let cure for 12h after installation and prior to packaging. Note: (3) top holes should be facing up.

A/R Magnobond 6398 : 115580 exp. 07/2011

2-Install supports and clamps as per Dwg D206-667-243. Torque clamps to 80-100 in lb

100 in lb ml 10/11 23 (1)

m 10 11 22 (1)

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Required Date: 10/27/2010 Req'd Qty: 1.00

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

240

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

250

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

260

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

270

0.00



Packaging

Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPP D206-667-203

Location: 53PPP Rev: 53

280

0.00



QC

QC21- Final Inspection - Work Order Release

Memo

0.00

Quality Control

10/14/2410/11/2510-11-24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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# Picklist Print

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Page 1

Work Order ID: 62745

Parent Item: D206-667-203

Parent Item Name: Crosstube Aft



Start Date: 10/7/2010

Required Date: 10/27/2010

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:F 05.09.01 Add holes for compatibility with Bell Skidtubes KJ/JLM  
 IPP Rev:G 08-06-03 update as per DSI9415 (ECN1198) DD verified by:ec  
 IPP Rev:H 08-07-18 remove thread masking in step 12 DD verified by:EC  
 IPP Rev:I 08-12-15 add magnobond DD verified by:EC  
 IPP Rev J 09.01.06 ECN 08-562 EC verified by:DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D206-667-203TRN 		Manufactured	No			220	Each	2.0000	1	1			
Crosstube Turning Detail													

Location

Loc Qty

Loc Code

LG

2

61983

1

62029

1

B# 62634

D2873-043 		Manufactured	No			220	Each	16.0000	2	2			
Nut Plate Assembly													

Location

Loc Qty

Loc Code

ST

16

60981

16

B# 62380

D2873-045 		Manufactured	No			220	Each	14.0000	2	2			
Nut Plate Assembly													

Location

Loc Qty

Loc Code

LG

14

60982

14

B# 62378

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Parent Item: D206-667-203

Parent Item Name: Crosstube Aft

Start Date: 10/7/2010

Required Date: 10/27/2010

Start Qty: 1.00

Required Qty: 1.00

D2892-1 Manufactured No

230 Each

32.0000

2 2



Support

Location

Loc Qty

Loc Code

LG

32

41986

12

42785

20

D3595-063-450 Manufactured No

230 Each

121.6590

4 4



RUBBER CUSHION

Location

Loc Qty

Loc Code

LG

121.6589737

53775

5.97897368

58161

3.56

59580

10.12

61465

72

62535

30

MS20601-AD4W10 Purchased No

230 Each

32.0000

14 14



RIVET

Location

Loc Qty

Loc Code

LG051

18

114245

2

115405

16

ST322

14

113220

14

B#115881

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Shop Packet Print

Page 2

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Start Date: 10/7/2010

Required Date: 10/27/2010

Start Qty: 1.00

Required Qty: 1.00

MS21920-22

Purchased

No

230

Each

62.0000

4

4



Clamp(per MIL-DTL-8783C)



ml 10-11-22

## Location

## Loc Qty

## Loc Code

LG

62

114077

62

AN5-10A

Purchased

No

250

Each

305.0000

10

10



Bolt



10/11/238p

## Location

## Loc Qty

## Loc Code

ST337

305

115108

18

115429

50

115589

100

115700

137

AN5-32A

Purchased

No

250

Each

300.0000

4

4



Bolt



10/11/238p

## Location

## Loc Qty

## Loc Code

ST340

300

114056

40

114405

50

115016

50

115108

50

115589

60

115698

50

4

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Shop Packet Print

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Start Date: 10/7/2010

Required Date: 10/27/2010

Start Qty: 1.00

Required Qty: 1.00

S AN5-34A  
Bolt

Purchased

No

250

Each

68.0000

4

4



10/11/238

## Location

## Loc Qty

## Loc Code

ST340

68

113149

2

113226

46

115835

20

4

S AN960JD516  
Washer

NAS1149D0563J

Purchased

No

250

Each

34.0000

18

18



1114742 10/11/238

## Location

## Loc Qty

## Loc Code

ST

34

103694

18

107534

12

109287

4

S MS21042L5  
Nut

Purchased

No

250

Each

895.0000

4

4



10/11/238

## Location

## Loc Qty

## Loc Code

ST139

26

114813

26

ST300

869

115156

369

115594

500

4

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

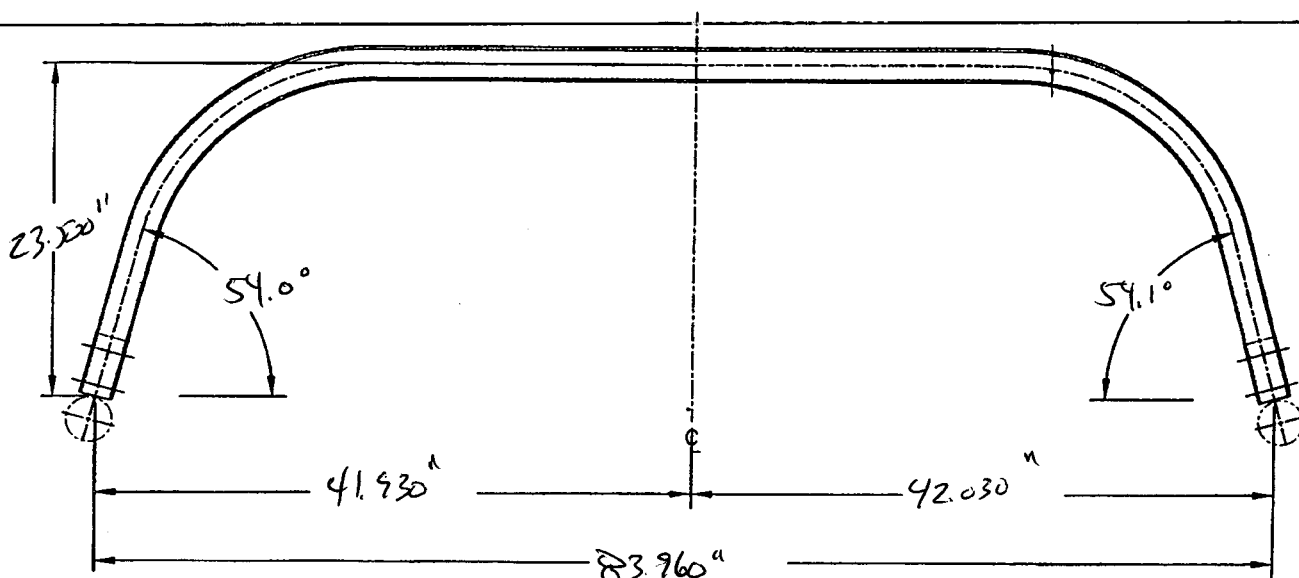
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<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	62725
<b>Description:</b> Crosstube High Aft (206L)		<b>Part Number:</b>	D206-667-203
<b>Inspection Dwg:</b> D206-667-243 <b>Rev:</b> C		<b>Page 1 of 1</b>	

Required Dimension	Min	Max
Height	23.39	23.65
1/2 Span	41.79	42.05
Angle	54	56
Total Span	83.58	84.1



Comments

QC15 Inspection	<i>[Signature]</i>
Date	10/1/08

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	09.11.17	Dwg Rev updated	KJ	
C	09.12.14	Dimensions update per Dwg Rev C	KJ	<i>[Signature]</i>

41.930  
41.930  
83.960

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Item	Qty -243	Part Number	Description
1	X	D206-667-243	CROSSTUBE ASSEMBLY (206L HIGH AFT)
2	1	D6004-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2892-1	SUPPORT
6	4	D3595-063-450	RUBBER CUSHION
7	4	MS21920-22	CLAMP
8	14	MS20601AD4W10	RIVET (OR NAS9302B-4-10)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299- 947-100, TYPE II, CLASS 2 ADHESIVE)

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6004-115  
FINISHED LENGTH = 104.91±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D206-667-243" AND BATCH NUMBER ON  
INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 21.9 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY,  
TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE  
TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2892-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER  
QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-22 CLAMPS WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE  
D2892-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS ARE  
LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS  
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT  
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TO TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN  
SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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WITH FILE NO.  
WORK ORDER  
NO. 62715  
2/10-10-07

RELEASED  
8/11/17

C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-450 WAS D2856-400-773 (ZN D6-2 & A5-2); REMOVED REF. & ADD TOLERANCES (ZN 4-3, C5-3, D3-3); RELOCATED FLAG #6 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHTAA SKUDTUBES	PH	05.07.26
A	NEW ISSUE	CP	00.11.17
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF	DRAWING NO.	REV. C
CHECKED	RF	D206-667-243	SHEET 1 OF 4
MFG. APPR.	RF	TITLE	SCALE
APPROVED	RF	CROSSTUBE ASSY (206L HIGH AFT)	NTS
DE APPR.	RF	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD	
DATE	08.11.06		

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

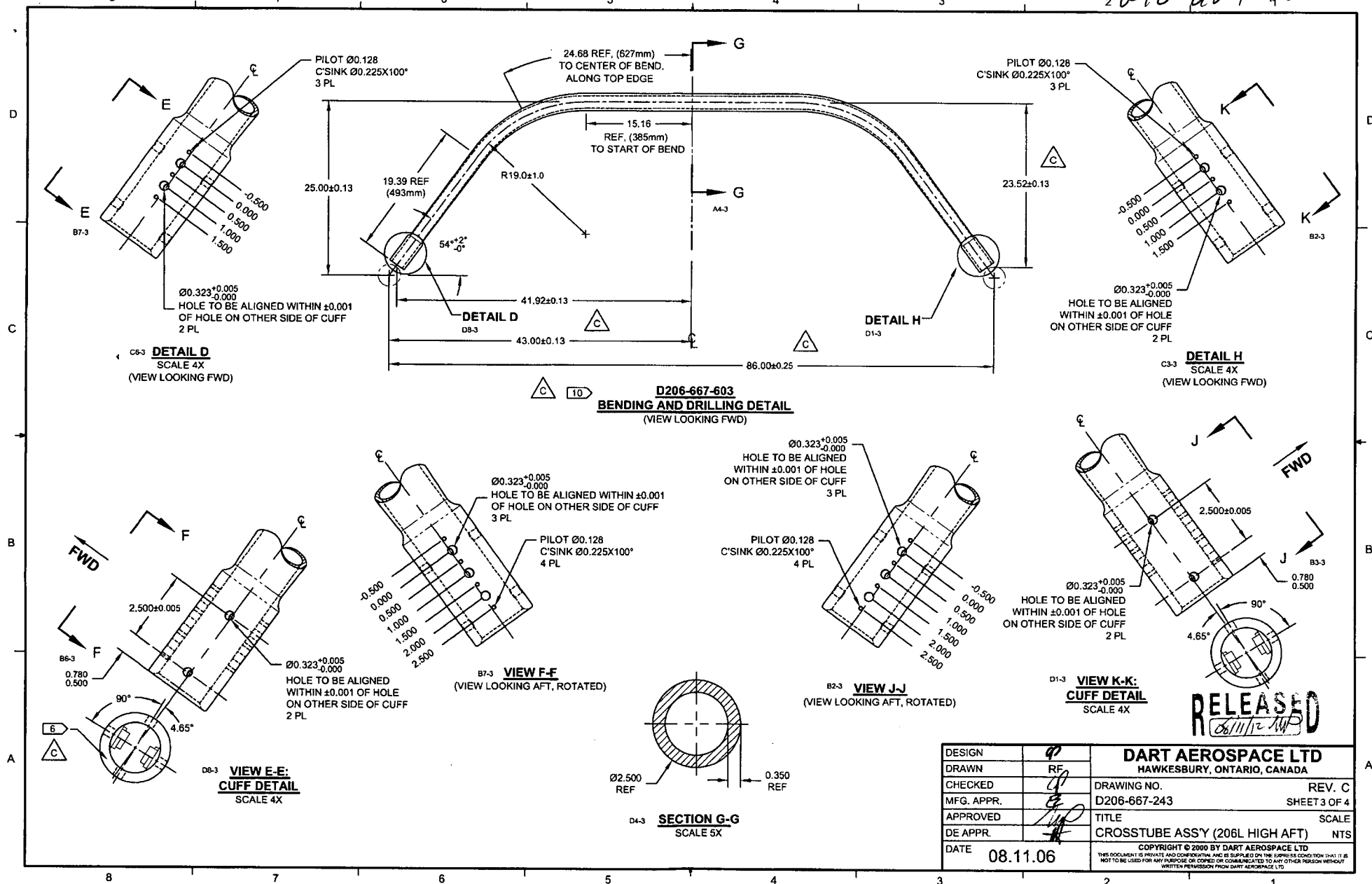
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Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

2 W/O 02745



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

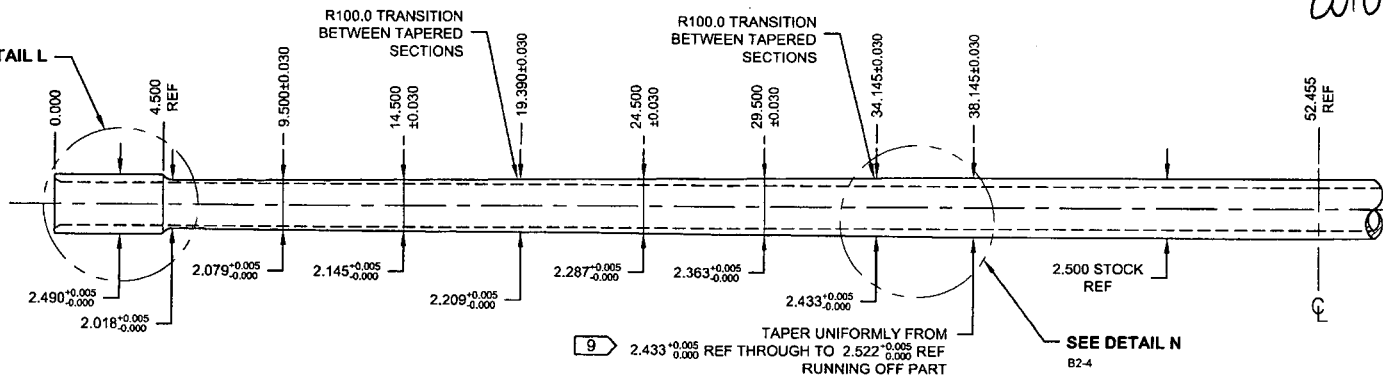
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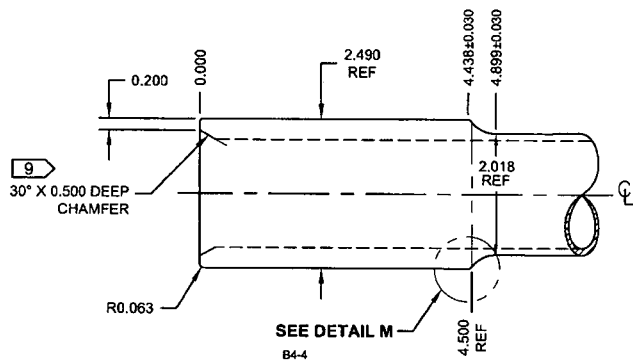


W/O 62945

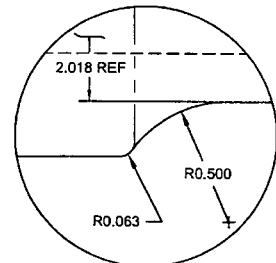
SEE DETAIL L  
B7-4



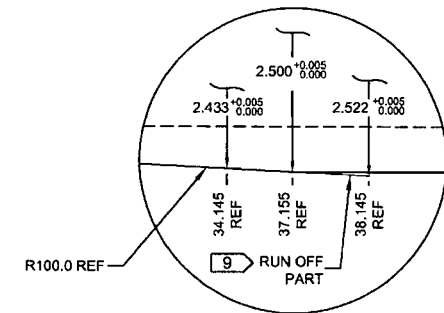
**TURNING DETAIL**



C7-4 **DETAIL L: CROSSTUBE CUFF**  
NOT TO SCALE



B6-4 **DETAIL M: CUFF TRANSITION**  
NOT TO SCALE



C4-4 **DETAIL N: TAPER RUN-OFF**  
NOT TO SCALE

**RELEASED**  
08/11/06

DESIGN	9	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	LP	DRAWING NO.	REV. C
MFG. APPR.	EP	D206-667-243	SHEET 4 OF 4
APPROVED	EP	TITLE	SCALE
DE APPR.	EP	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
DATE	08.11.06	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR LOANED OR COMMINGLED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

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## LIQUID PENETRANT TEST REPORT

P- 15198

PAGE 1 OF 1

CLIENT DART AERO SPACE DATE Nov. 12. 2010 TIME AM ☒ PM ☐  
ATTENTION LINDA LACELLE ACUREN JOB NO. 188-10-0937  
ADDRESS 1270 ABERDEEN ST. PO/WO NO. 12712 -  
HAWKES BURY, ON. WORK LOCATION HAWKES BURY PLANT.  
ACCEPTANCE STD. ASTM 1417/ REV./DATE 2007  
PROJECT F.P.I. ON CROSS TUBES.  
ITEM(S) EXAMINED 8 UNITS.

JOB DESCRIPTION PROCEDURE NO. LT-002 REV./DATE 2008 TECHNIQUE NO. LT-TECH2 REV./DATE 2008  
PART NO. CROSS TUBES - SEE RESULTS MATERIAL ALUMINUM THICKNESS —  
SCOPE WET FLOUORESCENT LIQUID PENETRANT INSPECTION  
CARRIED OUT ON 100% EXTERNAL SURFACE.

## TEST DETAILS

METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNA FLUX BLACK LIGHT S/N 16459 ☐ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT 2LG7 MINIMUM DWELL TIME 1045 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER H2O MINIMUM DRY TIME >10 MIN. OTHER  
DEVELOPER SKD 52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N 1098866 CAL DUE DATE  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY 067-19-2011

## TEST SURFACE

SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < - 4°C/ 20°F ☐ - 4°C/ 20°F TO 10°C/50°F ☐ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- ( ☐ METRIC ☐ IMPERIAL )

1 CROSS TUBE: W.O. 62923 ✓  
1 CROSS TUBE: W.O. 62924 ✓  
1 CROSS TUBE: W.O. 62746 ✓  
1 CROSS TUBE: W.O. 62745 ✓  
1 CROSS TUBE: W.O. 63019 ✓  
1 CROSS TUBE: W.O. 63018 ✓  
1 CROSS TUBE: W.O. 62190 ✓  
1 CROSS TUBE: W.O. 62189 ✓  
MA 10.11.15

## Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE MAH MURDOCH MAH MURDOCH DTR # E03234  
TECHNICIAN (SIGNATURE): Mike Horsman REPORT REVIEWED BY:  
NAME (PRINT): Mike Horsman NAME INITIALS  
1<sup>ST</sup> TECHNICIAN 2<sup>ND</sup> TECHNICIAN  
CGSB LEVEL 2 SNT LEVEL \_\_\_\_\_ CGSB LEVEL \_\_\_\_\_ SNT LEVEL \_\_\_\_\_  
CGSB REG. NO. 6606 CGSB REG. NO. \_\_\_\_\_